

Compliments of the
Dessan (S. H.) *Author*

OBSERVATIONS
ON
PERTUSSIS;

BASED UPON
AN ANALYSIS OF 361 CASES.

BY

A
S. HENRY DESSA^A, M.D.,

Physician to Out-Door Department New York Foundling Asylum; District Physician to New York Dispensary; Fellow of Academy of Medicine, etc.

Reprinted from THE AMERICAN JOURNAL OF OBSTETRICS AND DISEASES OF WOMEN AND CHILDREN, Vol. XIV., No. II., April, 1881.

NEW YORK:
WILLIAM WOOD & CO., PUBLISHERS, 27 GREAT JONES STREET.
1881.

OBSERVATIONS
ON
PERTUSSIS;

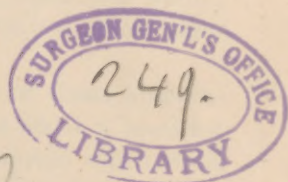
BASED UPON

AN ANALYSIS OF 361 CASES.

BY

S. HENRY DESSAU, M.D.,

Physician to Out-Door Department New York Foundling Asylum; District Physician to New York Dispensary; Fellow of Academy of Medicine, etc.



*Reprinted from THE AMERICAN JOURNAL OF OBSTETRICS AND DISEASES OF
WOMEN AND CHILDREN, Vol. XIV., No. II., April, 1881.*

NEW YORK:
WILLIAM WOOD & CO., PUBLISHERS, 27 GREAT JONES STREET.
1881.

OBSERVATIONS ON PERTUSSIS, BASED UPON AN ANALYSIS
OF THREE HUNDRED AND SIXTY-ONE CASES.

BY

S. HENRY DESSAU, M.D.,

Physician to Out-Door Department New York Foundling Asylum, District Physician to
New York Dispensary, Fellow of Acad. Med., etc.

I PROPOSE, in this paper, to present the results of my experience and observations, during the past ten years, in relation to pertussis. The cases which I shall use for this purpose have all been treated in public institutions devoted to children's diseases, and thus fortunately furnish records upon which to base tabulated results. The notes of many cases were not kept as complete as could be desired, but, upon the whole, sufficient data have been gathered from which to select some interesting information.

Pertussis has been chosen as the subject of these observations, not so much on account of the interest which is involved in the disease itself, but because of the sequelæ which often follow, and the complications which may occur in the course of the disease. Very few deaths are ever ascribed to pertussis directly, but the mortality from diseases of the lungs, brain, and general system which are induced by it, holds a prominent rank in the record of mortuary statistics. According to West, it ranks in London fourth amongst the causes of death below five years of age. When it is remembered that pertussis is a specific contagious disease, acting in every particular upon the general system in the same manner as the specific eruptive fevers, the interest in its observations will at once be heightened.

The records which I have prepared have been divided into two series. The first series of two hundred and fifty-eight cases were observed during my charge of the class for children's diseases at the New York Dispensary, from 1871 to 1876; the second series of one hundred and three were observed in the Out-door Department of the New York Found-

ling Asylum, from 1874 to 1881. This plan is adopted more especially because, in the last series, none of the patients, out of a total number at all times of over eight hundred, were over six years of age, and because more accurate knowledge of results has been obtained from them.

First Series.

Total number of males.....	114
Total number of females.....	144
	<hr/>
	258
Both sexes under 1 year of age.....	59
Both sexes from 1 to 5 years of age.....	160
Both sexes above 5 years of age.....	39

Of those above five years of age, one was a girl thirteen years old, one a girl twelve years old, and one a boy twelve years old.

Second Series.

Total number of males.....	41
Total number of females.....	62
	<hr/>
	103
Males under 1 year old.....	15
Females under 1 year old.....	24
Males from 1 to 5 years of age.....	26
Females from 1 to 5 years of age.....	38

There is scarcely need to direct attention to the fact presented by these tables, that girls are more frequently affected with whooping-cough than boys, in the proportion of 2 to 1.50, and that this ratio appears to hold good for all ages. This agrees with the experience of my friend, Dr. P. B. Porter, of this city, who also considers that girls suffer more severe attacks than boys. It is also corroborated by the statistics of Unruh, of Dresden, based upon an analysis of one thousand nine hundred and fifty-two cases occurring in the Out-door Department of the Hospital for Children in Dresden (*British Medical Journal*, June 7th, 1879). It will also be seen that pertussis attacks children from one to five years of age more frequently than at any other period. In this respect, it follows the contagious eruptive fevers. The fact that at this period of childhood the nervous system is in a highly sen-

sitive state, due to the process of dentition and rapid development of the perceptive faculties, will readily explain the reason why a disease, whose principal feature appears to be of a nervous character, affects the majority of children at this age. Fortunately, pertussis does not attack such a large number of children under one year of age, for at this period it is extremely apt to result fatally, owing to complications of convulsions and catarrhal pneumonia, especially in infants of a rickety or strumous diathesis; and to exhaustion, due to the early age of the infant. Above the age of five years, the danger of complications in pertussis grows rapidly less, and the disease, as a rule, runs a harmless course.

In regard to the season of the year when pertussis is most prevalent, it was found that for the combined series there were in January, 27; February, 22; March, 22; April, 23; May, 24; June, 30; July, 41; August, 42; September, 42; October, 32; November, 40; December, 16. It would thus appear that the affection was more prevalent during the summer and fall months. Unruh's statistics agree with mine in this respect, especially as regards the month of August.

Nothing especially new in reference to certain symptoms of the disease by which it can be recognized in the *earliest* stages can be offered. I have frequently observed a continuous rise of temperature, moderate in degree, lasting a week or more. This fact, taken in connection with a cough occurring in frequent short paroxysms, without the physical signs of a bronchitis, is regarded by Trousseau as one of the most reliable early indications of pertussis. The temperature rarely rises above 101° F., though in exceptional cases it may rise to 105° F. without any complication being present.

One of the most reliable signs of pertussis, which, in fact, when observed, has been considered as a rule pathognomonic, is the ulcer under the tongue. In the first series of my cases, this lesion was observed in fifteen cases, all of which were over six months of age. It is fair to state in this connection, that the ulcer was not looked for in the first one hundred and fifty cases. It was not always found on the frenum linguæ, but on either side as well. In the first series, it was found as early as the eighth day of the attack, in a boy three years old, who, strange to say, did not whoop. It was seen at the end of the

second week of the disease in a child six years old, and in a child fourteen months old it was seen as late as the end of the second month of the disease. In the second series, the ulcer under the tongue was observed in only twelve cases out of the entire number. Every case in which it was found was over six months of age, and dentition had begun. The earliest age at which it was seen was ten months. This was in a girl, who, after recovering entirely from the disease, was suffering four months later with a simple bronchitis. She was seen on the third day of the cough, when the ulcer was detected, and there were present all the physical signs of a bronchial catarrh, such as fine and coarse râles over both lungs, with normal resonance, laborious expiration, and a temperature of $103\frac{1}{2}^{\circ}$ F. in the rectum. She was seen one week later, when all the symptoms had improved, and in another week she was entirely free from cough. This case would go to prove the exception to the rule that the sublingual ulcer is found only in pertussis. In the case of a girl thirteen months old, the ulcer was observed four days from the first spell of coughing, and five days later it had taken on a papillomatous form of growth. In fourteen days from the time of its first observance, it was commencing to heal, as the severity of the cough was moderating rapidly.

The observance of the sublingual ulcer in pertussis, as a new symptom of the disease, appeared to create quite a degree of attention in the medical world in the early part of the last decade, but according to Vogel, it had been described by various German writers as early as 1844. Vogel, McCall, and other authors regard the sublingual ulcer in the light of an accidental lesion, limited to a certain period of childhood when the lower incisor teeth are new and their edges sharp. These writers explain the lesion as caused by the tongue being forcibly protruded against these sharp teeth during the paroxysms of coughing, the frenum being injured thereby. Vogel states that it may occur, as in the case cited above, in simple bronchitis, also in those without any cough, as in a case I shall mention, in the form of aphthous ulceration, especially during dentition. Drs. Delthil, of Paris, and Blake, of England, on the other hand, do not believe that this peculiar ulcer depends upon mechanical causes, but that it is a pathological feature of

the disease, and is the primary phenomenon of a general infection, the same as chancre is in syphilis. Dr. Delthil, in a paper on the subject read before the Académie de Médecine (*Bulletin de l'Académie*, February 6th, 1877), reported two cases in which it was observed prior to dentition.

In the twenty-seven cases which were observed by me, all, as before stated, had begun teething. Four of the cases were over four years of age, consequently it was not limited, in my experience, to the period when the lower incisor teeth are particularly sharp. In one instance, in a girl, it was accompanied in the second week of the disease with a general ulcerative stomatitis, with diphtheroid exudation, affecting the soft palate, cheeks, and lips, which eventually developed into a gangrenous stomatitis, and destroyed the patient. In another case of a boy four years old, there was a slight ulcer under the tongue, and at the same time a general ulcerative follicular stomatitis, with a papular eruption over the entire trunk and extremities, which itched greatly. I have also observed the sublingual ulcer in a child affected with follicular stomatitis, who had no cough of any description.

The value of the sublingual ulcer as an early diagnostic sign of pertussis is not great, so far as my observation goes. In the twenty-seven cases in which it was observed, the earliest date of its detection was on the fourth day of the whoop, this in one case only. This would be equivalent to about the eighth or twelfth day of the disease. The case mentioned before, where it was seen on the eighth day in a boy who did not whoop was, in all probability, the eighth day of the paroxysms, though they terminated without the characteristic whoop. In fact, it may be said that the ulcer does not, according to my experience, appear prior to the development of the spasmodic stage of the cough. It was observed that the ulcer began to heal as soon as the severity of the paroxysms were mitigated. It may not be out of place at this point to mention a simple method referred to by Vogel for diagnosing pertussis when the paroxysms are not witnessed by the medical attendant. It consists in pressing the root of the tongue with the finger, when a paroxysm of coughing will usually be induced.

The results of *treatment*, based upon the records of my first

series of cases, I am sorry to say, are not very trustworthy, owing to the fact that, in dispensary practice, it is a matter of impossibility to follow the cases to their termination. This statement will be readily appreciated when it is learned that a record of only one death, and that one from convulsions as a complication, has been found out of a total of two hundred and fifty-eight cases. For the purpose, however, of hereafter expressing my preference for a certain method of treatment, it may be well for me to make known the various treatments that I have employed. In the first series, thirty-eight were treated with sulphate quinine, given in large doses, from eight to twenty-four grains, according to age, in the twenty-four hours. My usual plan is to administer the quinine in a strong infusion of black coffee, used cold. Forty-three were treated with a combination of quinine and extract belladonna; forty-four with carbonate of potash and cochineal, given in the syrup of wild-cherry bark; four with carbonate of potash and belladonna; twenty-nine with belladonna alone, both in the form of tincture and solid extract, given in gradually increased doses, until the full physiological effect is produced; eight with belladonna and bromide of potassium; three with bromide of potassium in syrup of wild-cherry; twelve with chloral hydrate, given with the syrup of wild-cherry; thirty-six with a combination of chloral and bromide of potassium, given in the last-named menstruum; fifteen with iodide of silver, under which treatment the fatal case recorded occurred; five with inhalations of a mixture of sulphuric ether, sixty parts; chloroform, thirty parts; and spirits of turpentine, ten parts, originally proposed by Dr. Wilde; and twenty-one with various other plans of treatment, including combinations of bromide of ammonium and belladonna, bromide of ammonium and diluted hydrocyanic acid, belladonna and diluted hydrocyanic acid and visits to the gas-works, also the asphalted tube-works (at the foot of 106th street, East river, where accommodations for patients are prepared), as an adjunct treatment. In the second series the results are more accurate and may be depended upon as almost entirely correct. In this series 7 were treated with quinine and belladonna; 24 with belladonna only; 54 with chloral hydrate and bromide of potassium; 4 with iodide of silver; 5 with salicylic acid or salicine, used both as

insufflations and internally; 3 with alum and syr. prun. virg. (used in chronic cases); 3 with tincture of *drosera rotundifolia*, given in doses from a fraction of a drop to 10 drops 3 times daily; 3 with carbazotate or picrate of ammonium, in a solution of 1 grain to the ounce, and a teaspoonful given 3 times in the 24 hours; and 1 with Roche's embrocation, which is supposed to consist of one part of olive oil and half a part each of oil of cloves and oil of amber. Under these various methods of treatment there occurred 10 deaths, the causes of which the following table will explain:

Girl, 3½ years. At the time of attack was improving from a chronic interstitial pneumonia of the apex of 16 months' duration. All the symptoms were soon aggravated, and she died from exhaustion in the fourth week of the disease. Received chloral hydrate and bromide potassium for pertussis.

Girl, 2 years. 6 days after first seen had a diphtheritic deposit on uvula, 1 week later had ulcerative stomatitis, and 2 weeks later, gangrenous stomatitis, from which she died 1 month from date of first visit; received chloral and bromide potassium.

Girl, 3 months. Seen only once; no complication mentioned; received belladonna.

Girl, 2 years. Cough began with bronchitis; seen only once; died at end of second week from catarrhal pneumonia most probably; received chloral and bromide potassium.

Girl, 5 weeks. Had pertussis 3 weeks; attack severe; 24 spells in 24 hours; bronchitis developed in third week which terminated in catarrhal pneumonia, and she died at end of the fourth week; received chloral and bromide potassium.

Girl, 1 month. Began with convulsions; seen on first day of whoop, and not afterwards; died end of fourth week; complication not known; received chloral and bromide potassium.

Girl, 3 months. Had pertussis 2 weeks, no whoop, but became cyanosed when coughing; died 2 days after first seen of convulsions; received chloral and bromide potassium.

Boy, 4 years. Had struma before pertussis began; became weak and feverish; died of exhaustion; received belladonna, afterwards quinine.

Boy, 18 months. No complication noted; was wasting; seen twice; died 9 weeks after last visit; received chloral and bromide potassium, afterwards quinine.

Boy, 2 months. Had cough eight days when first seen; had at first visit bronchitis, which developed into catarrhal pneumonia; died at end of second week; received chloral and bromide potassium.

In order to appreciate the true value of the different treatments above employed, it would be necessary to possess a record of the duration of the cough from its commencement,

as well as the total length of time that the patient was under treatment in each case. Unfortunately, in the out-door department of even such a well conducted institution as the New York Foundling Asylum, such a system cannot be carried out. Sufficient illustrations, however, of the benefit of treatment in severe cases have been furnished to justify me in adopting a preference. From the combined numbers of both series it will be observed that 90 cases received the chloral hydrate and bromide of potassium in syr. prun. virg., which treatment I have so far been led to prefer above all others that I have tried. I had used chloral alone, upon the recommendation of Dr. P. B. Porter, of this city, in the treatment of pertussis as early as the winter of 1872. It would seem from the small number of cases in which I continued to prescribe it, that I was not very deeply impressed with its efficiency, and it was not until three years later that I began to use the chloral in combination with bromide of potassium. About the same time, I prescribed the bromide alone or in combination with belladonna in eleven cases, but finally settled upon chloral and bromide as the most effective combination.

In endeavoring to arrive at the best therapeutical results, it is always necessary to have a clear idea of the pathological process of the disease in question. It will be seen from the drugs employed, that pertussis has been regarded both as a specific catarrh and as a neurosis. Trousseau, whom I regard as having correct views on most medical subjects, believes that it is both, and each element of the disease runs a parallel course. The purpose of a separate treatment was to satisfy myself on this point. While I am willing to admit the complex character of pertussis, I am inclined to the opinion that the neurotic element is by far the most important in regard to treatment, as by this means the danger of the most fatal complications of the disease are better avoided. The theory has lately been advanced by Dr. Guéneau De Mussy (*Union Médicale*, Jan. 11th, 1877), that pertussis is a specific catarrh, localizing itself in the larger bronchial tubes and secondarily causing enlargement of the tracheo-bronchial glands, which glands, pressing upon the pneumogastric and inferior laryngeal nerves, cause an irritation of those nerves, manifested in the spasmodic element of the cough. These adenopathies explain.

in Dr. De Mussy's opinion, the reason why the spasmodic cough does not set in until the second or third week of the affection; why the cough may persist for months and years in certain subjects; why, when the swellings are not completely dispersed and a tendency remains for them to be reproduced, the cough returns after an attack of bronchitis, measles, etc.; and why, when the adenitis is but slightly developed, the spasmodic cough is absent, though there is every reason to believe that pertussis is present. It is very evident that the investigations of Dr. De Mussy are steps taken in the right direction towards explaining the pathology of the disease, but they require further observation and corroboration. If his theory is correct, the proper therapeutics should be directed to the catarrh of the bronchi, and, this being cured, the disease would be under control. It remains to be proven whether or no this can be done. Previous to this time the vast majority of the medical profession have almost ignored the catarrhal element of the disease, and have directed their therapeutics to the neurotic element of the disease.

In the combination of chloral hydrate and bromide of potassium I believe several important indications in the therapeutics of pertussis have been met. While the neurotic feature of the disease has been kept most prominently in view, the specific catarrhal element has not been overlooked. Late investigations have attributed to chloral the property of locally arresting germ growth, and it therefore deserves to share the same value as other remedies regarded as antiseptic, when given internally, besides that of its undisputed sedative action.

It is an accepted view among our best therapeutists that the potash salts certainly possess the properties of promoting tissue changes, dissolving albuminoids in the blood, and rendering the mucous secretions more fluid. These properties would tend to the idea that potash exerts an alterative influence upon mucous membranes, and it has been used largely for this purpose, no doubt with beneficial results. The carbonate of potash treatment of pertussis is very likely based upon this view, and has for years been employed by the profession of Philadelphia. It is reasonable to suppose that the bromide of potassium is decomposed in the system, and while the bromine acts as a sedative upon the nerve-centres, with a special tend-

ency to allay reflex excitability of the larynx, the potash exerts its influence upon the mucous membranes, besides having a slight sedative action upon the reflex nervous centres. Furthermore, the sedative action of chloral has been found to be increased by the bromine salts and vice-versa, so that the chloral may be reduced to one-half the dose by combining it with double the quantity of the bromide. This is a point not to be overlooked in the administration of an article so uncertain in its poisonous effects as chloral, though I have always found, and hazard the assertion, that its action is harmless in children unless given in excessive quantities. Another property of chloral which is worthy of notice in this connection is its influence upon the reduction of blood pressure when carefully administered. This property is of service in preventing the complication of catarrhal pneumonia or modifying its development when already present.

Another complication of pertussis, which in children under one year of age is a most dangerous one, is diarrhea. Here, also the chloral and bromide of potassium are of valuable service, though it may be necessary to add other remedies to aid in checking the bowels. Chloral has been highly recommended in the treatment of infantile diarrhea, and bromide of potassium has become an established treatment in our city amongst certain physicians for this complaint.

My experience in the treatment of pertussis has led me to believe that mild cases of the disease will end in a short space of time under any kind of treatment, while in severe cases it is often a difficult matter to find any remedy that will mitigate the severity of the paroxysms and reduce their frequency, and none will shorten the duration of the disease to any marked degree. I have found that the chloral and bromide, while it undoubtedly moderates the severity of the paroxysms and also reduces their frequency, does not exert any great influence in shortening the average duration of the disease. Thus I present the following case copied from the records of the Outdoor Department of the New York Foundling Asylum:

A girl 11 months old had pertussis 4 weeks; there was a superficial ulcer under the tongue; temperature, 105° F. in the rectum; lips dry; had a very severe attack the week before; became cyanotic. Gave chloral hyd., 3 ij.; potass. brom., 3 iv.; syr. prun. virg. and water, of each one ounce; a teaspoonful to be given 3

times daily. Hydrobromide of cinchonidia, gr. ij. every 3 hours to reduce temperature. Two weeks later, temperature 101° F. in rectum; ulcer healed; cough much improved; appetite improved; has some bronchitis; medicine renewed. Two weeks later the whoop had entirely ceased. Here the disease lasted 8 weeks at the shortest, while the paroxysms were mitigated soon after the treatment was begun.

The dose of chloral may be considered large, and was double that usually given at the same age; but the severity of the attacks seemed to demand it, and the result proved that my judgment was correct. Another case will serve to show the effect of the treatment upon the frequency of the paroxysms:

A boy 4 months old had pertussis one month; had 17 spells in the 24 hours the day before he came under treatment. Gave chloral, 3 i.; potass. brom., 3 ij.; in syr. prun. virg. and water, of each one ounce; teaspoonful 3 times daily. Record of paroxysms for the following 4 days, kept by the nurse sticking a pin through a piece of note-paper after each spell, keeping a line for each 24 hours: 21, 11, 12, 8. Medicine was renewed, and on the eighth day of treatment and the end of the fifth week of the disease, there were 3 spells up to 3 P.M., commencing to count from 8 A.M.

A case occurring in my private practice will also serve to illustrate the effect of this treatment, both on the frequency and severity of the paroxysms and the duration of the disease:

Jessie M., 4 years old, had pertussis for 2 weeks before she came under my care. Whoops; vomits after coughing; the spells of coughing are very severe. Gave chloral hyd., 5 grains; with brom. potass., 10 grains in syr. prun. virg., 3 times daily. Record of spells: July 23d, 20; 24th, 13; 25th, 23; 26th, 17; 27th, 9; 28th, 17; 29th, 17; ordered double dose night and morning; 30th, 12; 31st, 14; Aug. 1st, 10; 2d, 6; 3d, 12; 4th, 19; all very light; 5th, 10. The spells now became so light, without whooping or vomiting, that a further count was not kept.

I might also refer to the case of a boy six months old, not included in these statistics, to whom I was hurriedly called and found in a state of unconsciousness, his face cyanotic, and respiration suspended, which condition had lasted for four or five minutes. The heart was beating feebly, and I at once used artificial respiration, at the same time making the mother push a large feather down the larynx to clear out the ropy mucus and also, if possible, to irritate the glottis. I soon succeeded in inducing normal respiration, without any whoop, however. I learned that he had had several attacks within a few days almost

as severe as this one. I prescribed the chloral and bromide of potassium in free doses for his age and from that time on the spells were of moderate severity, and he made a speedy recovery. I have stated in the early part of this paper that the chief interest attached to pertussis was due to the complications of the disease. The following table will show the frequency with which they occurred in the second series of cases.

Of Catarrhal Pneumonia there were Eleven Cases, as follows:

Boy, $2\frac{1}{2}$ years old; began in the fourth week of disease, accompanied with diarrhea.

Boy, 8 months old; present when first seen.

Boy, 3 months old; began in the eleventh week of disease. Had bronchitis when disease began.

Boy, 2 months old; began in the second week of disease. Had bronchitis when disease began.

Boy, 1 year old; began in the third week of disease.

Girl, 2 years old; began in the third week of disease. Began with convulsions, also diarrhea.

Girl, 6 months old; began in the fifth week of disease.

Girl, $3\frac{1}{2}$ years old; began in the seventh week of disease.

Girl, 3 years old; began in the fourth week of disease. Terminated in fibroid induration.

Girl, 2 years old; began in the second week of disease. Began with bronchitis.

Girl, 5 weeks old; began in the third week of disease.

Of Convulsions there were Four Cases.

Girl, 2 years old; occurred in third week of disease when first seen.

Girl, 1 month old; began with the whoop.

Girl, 3 months old; occurred in second week of disease.

Girl, 2 years old; occurred in third week of disease, with catarrhal pneumonia.

There was one case of capillary bronchitis in a boy two years old. One case of gangrenous stomatitis in a girl two years old. Two cases of struma, both in boys, one three years old, the other eighteen months, developed during the disease. Six cases were followed by struma and one case by rickets. One case had struma when the disease began. A girl three and a half years old had a chronic pneumonia of the apex for sixteen months when pertussis began. The old trouble was rekindled, from which she afterwards died. A girl three years old had hemoptysis together with epistaxis. Two cases had hematuria. A boy four years old had choreic contractions of

the muscles of the arm and subsequently of the face three months after the disease began. He still had the cough, but did not whoop.

The greater frequency with which catarrhal pneumonia occurred as a complication of pertussis will be all the more readily appreciated, when the process of its pathological development is reflected upon. The first stage in the evolution of catarrhal pneumonia in pertussis is *collapse* to a greater or less extent of lung tissue. Collapse of the lung in pertussis depends upon the same mechanical cause as it does in bronchitis, with this addition, that in the former disease many more predisposing conditions, such as exhaustion from the violence of the attacks in early infancy, from an intercurrent diarrhea, especially in the summer months, and from the strumous and rachitic diathesis, which the disease itself, through its specific nature, is prone to develop, are present. The severity of the paroxysms plays a most important part in the production of collapse of the lung; for such violent expiratory efforts are made during the cough that most of the normal residual air in the vesicles is expelled; and in an exhausted system, or a rachitic child with soft bones, there is not strength enough left to overcome the external atmospheric pressure upon the chest-walls, and sufficient air to refill the emptied air-vesicles cannot be drawn beyond the thick and ropy mucus that fills the bronchial tubes. The walls of the emptied air-vesicles fall together, the circulation of the blood in the capillaries, owing to the loss of function of the air-vesicles and the imperfect aëration of the blood, becomes impeded, and a gradually increased rise of blood-pressure occurs, producing a hypergenesis of epithelial cells within the alveoli of the collapsed portion, until they are entirely occluded. The effect of gradual and continuous increased blood-pressure upon the causation of catarrhal pneumonia has been brilliantly described by Dr. D. J. Hamilton, of Edinburgh, in the twenty-fourth volume of the *London Practitioner*. I am indebted to his article for much valuable information on the subject.

It may happen that such an extensive portion of lung tissue becomes collapsed in pertussis that sudden death is caused

thereby. This unfortunate complication occurred in one of my cases not included in these statistics.

When bronchitis is present as a complication of pertussis, it may be readily understood that the danger of collapse of groups of air-vesicles is rendered immensely greater, and catarrhal pneumonia may almost certainly be expected. The gravity of catarrhal pneumonia as a complication of pertussis may be inferred, when it is considered that out of ten deaths from all causes, four were from this complication, in a total of eleven cases treated.

Convulsions occurring in pertussis are, perhaps, the most fatal complication of the disease, fifty per cent of those attacked in my cases having died.

With reference to the remaining complications mentioned, except in the case of hemoptysis, they offer nothing of especial interest. This complication, according to M. Henri Roger, in a paper read before the Académie de Médecine (*Gazette Médicale de Paris*, Sept. 20th, 1879), is nothing more than a pseudo-hemoptysis, the blood being furnished by the nose, mouth, or pharynx, and almost never by the lungs. This is likely to be the true explanation of the hemoptysis in my case, as there was epistaxis at the same time. Of the two cases of hematuria, little can be said. One occurred while using a solution of picrate of ammonium, one grain to the ounce.

In regard to the influence of change of locality upon pertussis, nothing has been said, because as a rule this plan of treatment is not adapted to the class of patients the record of whose cases form the basis of this paper.



